PHYS 543 Physics of Quarks and Leptons
Spring 2018

Professor Karl Ecklund
232C Herman Brown Hall
713-348-2037
Karl.Ecklund@rice.edu
Office Hours: Mon/Fri 1 – 2 pm or by arrangement

Meeting Time:
T Th 1:00 – 2:15 Herman Brown 223
(With the agreement of the course members, some class meetings may be rescheduled to alternate times to facilitate students' & instructor's travel schedules.)

Prerequisites:
The student is expected to be familiar with material taught in PHYS 542. Quantum Mechanics II (PHYS 522) is advantageous, but not required.

Course Description & Objectives:
A rigorous first-principles treatment of particle physics requires quantum field theory, a second-year graduate course, and such an approach to the subject demands more than one semester of study. However, a qualitative understanding of the essential physical concepts and phenomena is still possible with an undergraduate background in quantum mechanics and special relativity.
PHYS 542 is a broad survey of current knowledge in nuclear and particle physics at the conceptual level. PHYS 543 is a continuation of 542, building on the conceptual foundations to add detail and calculational tools. The course covers the structure of the standard model of particle physics – matter fields of quarks and leptons, and gauge fields leading to strong, electromagnetic and weak interactions – and key applications to experimental particle physics.

Textbook:
Quarks and Leptons: An Introductory Course in Modern Particle Physics
F. Halzen and A. D Martin
J. Wiley & Sons ISBN 0-471-88741-2

Additional readings may be made available in Canvas.

Other Resources:
The following book provides additional material and alternative approaches to the main textbook.

Introduction to Elementary Particles 2nd Edition, D. Griffiths
Wiley ISBN: 978-3-527-40601-2

Course Grade PHYS 543:
50% homework
50% class participation

PHYS 543 Physics of Quarks and Leptons
Spring 2018

Homework:
Homework will be assigned and handed in for credit. Solutions will be discussed in class. Students are permitted to discuss the homework with each other. However, the assignments should be completed based on each student's individual work.

Class structure:
Discussion in class is strongly encouraged, and for each meeting a student is asked to explain the assigned material. In other words, for each meeting you are expected to have prepared your notes such that you can stand in front of the class and explain the assigned chapter or sections thereof to your fellow students.

Schedule:

Class	**Halzen & Martin**
1	Chapter 1
2	2.1,2.2,2.3,2.4,2.5,2.6,2.7
3	2.8,2.9,2.10,2.11,2.13,2.15
4	3.1,3.2,3.3,3.5,3.6
5	3.6,3.7,4.1
6	4.2,4.3,4.4,4.5
7	4.6,4.7,4.8,5.1
8	5.2,5.3
9	5.4,5.5,5.6,5.7,6.1
10	6.1,6.2,6.3,6.4
11	6.5,6.6,6.7,6.8,6.9,6.10,6.11,6.12
12	6.12,6.13,6.14,6.15,6.16,6.17
13	7.1,7.2,7.3
14	7.4,7.5,7.6,.7.7,7.8
15	7.9,7.10, 8.1, 8.2
16	8.3,8.4,8.5
17	9.1,9.2,9.3,9.4
18	10.1,10.2,10.3,10.4
19	10.5,10,6,10.7,10.8,11.1
20	11.1,11.5,11.6,11.7,11.8,12
21	12.1,12.2,12.3,12.4
22	12.5,12.6,12.7,12.8
23	12.9,12.10,12.11,12.12,12.13,12.14
24	13.1,13.2,13.3,13.4
25	13.5,14.1,14.2,14.4
26	14.5,14.6,14.7,14.8,14.9
27	15.1,15.2,15.3,15.4, 15.6,15.7,15.8,15.9